

SEQUENCE LISTING

<110> Satoshi MORI
Kyoko Higuchi

<120> NICOTIANAMINE SYNTHASE AND GENE ENCODING
THE SAME

<130> 55107 (71526)

<140> 09/674,337

<141> 2000-10-30

<150> PCT/JP99/02305

<151> 1999-04-30

<160> 22

<170> FastSEQ for Windows Version 3.0

<210> 1

<211> 328

<212> PRT

<213> Hordeum vulgare L.

<400> 1

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			20				25					30			
Glu	Val	Asp	Arg	Leu	Phe	Thr	Asp	Leu	Val	Thr	Ala	Cys	Val	Pro	Pro
		35				40					45				
Ser	Pro	Val	Asp	Val	Thr	Lys	Leu	Ser	Pro	Glu	His	Gln	Arg	Met	Arg
	50					55				60					
Glu	Ala	Leu	Ile	Arg	Leu	Cys	Ser	Ala	Ala	Glu	Gly	Lys	Leu	Glu	Ala
65				70				75						80	
His	Tyr	Ala	Asp	Leu	Leu	Ala	Thr	Phe	Asp	Asn	Pro	Leu	Asp	His	Leu
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Gly	Leu	Phe	Pro	Tyr	Tyr	Ser	Asn	Tyr	Val	Asn	Leu	Ser	Arg	Leu	Glu
			100				105						110		
Tyr	Glu	Leu	Leu	Ala	Arg	His	Val	Pro	Gly	Ile	Ala	Pro	Ala	Arg	Val
	115					120						125			
Ala	Phe	Val	Gly	Ser	Gly	Pro	Leu	Pro	Phe	Ser	Ser	Leu	Val	Leu	Ala
	130				135					140					
Ala	His	His	Leu	Pro	Glu	Thr	Gln	Phe	Asp	Asn	Tyr	Asp	Leu	Cys	Gly
145				150					155					160	
Ala	Ala	Asn	Glu	Arg	Ala	Arg	Lys	Leu	Phe	Gly	Ala	Thr	Ala	Asp	Gly
			165				170						175		
Val	Gly	Ala	Arg	Met	Ser	Phe	His	Thr	Ala	Asp	Val	Ala	Asp	Leu	Thr
			180				185					190			
Gln	Glu	Leu	Gly	Ala	Tyr	Asp	Val	Val	Phe	Leu	Ala	Ala	Leu	Val	Gly
	195					200						205			
Met	Ala	Ala	Glu	Glu	Lys	Ala	Lys	Val	Ile	Ala	His	Leu	Gly	Ala	His
	210				215					220					
Met	Val	Glu	Gly	Ala	Ser	Leu	Val	Val	Arg	Ser	Ala	Arg	Pro	Arg	Gly
225					230					235					240

65					70					75				80	
Ala	His	Tyr	Ser	Asp	Met	Leu	Ala	Ala	Phe	Asp	Lys	Pro	Leu	Asp	His
				85					90					95	
Leu	Gly	Met	Phe	Pro	Tyr	Tyr	Asn	Asn	Tyr	Ile	Asn	Leu	Ser	Lys	Leu
			100					105					110		
Glu	Tyr	Glu	Leu	Leu	Ala	Arg	Tyr	Val	Pro	Gly	Gly	Tyr	Arg	Pro	Ala
			115				120					125			
Arg	Val	Ala	Phe	Ile	Gly	Ser	Gly	Pro	Leu	Pro	Phe	Ser	Ser	Phe	Val
			130			135					140				
Leu	Ala	Ala	Arg	His	Leu	Pro	Asp	Thr	Met	Phe	Asp	Asn	Tyr	Asp	Leu
145					150					155				160	
Cys	Gly	Ala	Ala	Asn	Asp	Arg	Ala	Ser	Lys	Leu	Phe	Arg	Ala	Asp	Arg
				165					170					175	
Asp	Val	Gly	Ala	Arg	Met	Ser	Phe	His	Thr	Ala	Asp	Val	Ala	Asp	Leu
			180					185					190		
Ala	Gly	Glu	Leu	Ala	Lys	Tyr	Asp	Val	Val	Phe	Leu	Ala	Ala	Leu	Val
			195				200					205			
Gly	Met	Ala	Ala	Glu	Asp	Lys	Ala	Lys	Val	Ile	Ala	His	Leu	Gly	Ala
			210			215					220				
His	Met	Ala	Asp	Gly	Ala	Ala	Leu	Val	Val	Arg	Ser	Ala	His	Gly	Ala
225					230					235				240	
Arg	Gly	Phe	Leu	Tyr	Pro	Ile	Val	Asp	Pro	Gln	Asp	Ile	Gly	Arg	Gly
				245				250					255		
Gly	Phe	Glu	Val	Leu	Ala	Val	Cys	His	Pro	Asp	Asp	Asp	Val	Val	Asn
			260				265					270			
Ser	Val	Ile	Ile	Ala	Gln	Lys	Ser	Lys	Asp	Val	His	Ala	Asp	Gly	Leu
		275				280					285				
Gly	Ser	Gly	Arg	Gly	Ala	Gly	Gly	Gln	Tyr	Ala	Arg	Gly	Thr	Val	Pro
		290			295					300					
Val	Val	Ser	Pro	Pro	Cys	Arg	Phe	Gly	Glu	Met	Val	Ala	Asp	Val	Thr
305					310				315					320	
Gln	Asn	His	Lys	Arg	Asp	Glu	Phe	Ala	Asn	Ala	Glu	Val	Ala	Phe	
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<210> 4

<211> 1342

<212> DNA

<213> Hordeum vulgare L.

<400> 4

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tcgctcagcc	catccccgga	cgctcgacgcg	ctcttcacgg	agctgggtcac	ggcgtgcgtt	180
ccaccgagtc	cagtggacgt	gaccaagctc	gggccggagg	cgcaggagat	gcgggagggc	240
ctcatccgcc	tatgctccga	ggccgagggg	aagctggagg	cgcactactc	cgacatgctc	300
gccgccttcg	acaagccgct	ggatcacctc	ggcatgttcc	cctactacaa	caactacatc	360
aacctcagca	agctcgagta	cgagctcctg	gcccgtacg	tgcctggcgg	ctatcgcccg	420
gcgcgcgtcg	cgttcatcgg	ctccggcccc	ctgccgttca	gctcctttgt	cctggcccg	480
cgccacctgc	ccgacaccat	gttcgacaac	tatgacctgt	gcggtgcggc	caacgatcgc	540
gccagcaagc	tcttccgcgc	ggatcgcgac	gtgggtgcc	gcatgtcgtt	ccacacggcc	600
gacgtcgcg	acctcgccgg	cgagctcgcc	aagtacgacg	ttgtcttctt	ggccgcactc	660
gtcggcatgg	ccgccgagga	caaggcgaag	gtgatcgcg	acctcggcgc	acacatggca	720
gacggggcgg	ccctcgtcgt	gcgcagcgca	cacggagcgc	gcgggttctt	gtacccgatc	780
gtcgaccccc	aggacatcgg	ccgaggcggg	ttcgaggtgc	tggccgtgtg	ccatcccgc	840
gacgacgtgg	tgaactccgt	catcatcgca	cagaagtcca	aggacgtgca	tgccgatgga	900
cttggcagcg	ggcgtgggtgc	cggtggacag	tacgcgcggg	gcacggtgcc	tggtgtcagc	960
cccccggtgca	gggttcggcga	gatggtggcg	gacgtgaccc	agaaccacaa	gagagacgag	1020

tttgccaacg	ccgaagtggc	cttttgatcg	ttcgctgcga	gggtgtgcat	ccatgatcca	1080
tccatacctc	gttctgtgat	tgcatacaagc	ttgcaatcgt	atgcatttca	agtcacgtgt	1140
tgcttctatc	caataatgta	cgtgtgggtgt	ttacacgcga	atgtcttgta	gacctttgta	1200
tgtgtacaag	tgaattttaa	ttcacaagta	catataatgg	tcaccattga	aaagatgttt	1260
agtgtgtgtt	ttccaatata	tgtttgtgta	aggttcatca	tctaataaaa	tatgtttgga	1320
acccaaaaaa	aaaaaaaaaa	aa				1342

<210> 5
 <211> 335
 <212> PRT
 <213> *Hordeum vulgare* L.

<400> 5

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Ile	Thr	Gly	Leu	His	Ala	Ala	Ile	Ala	Lys	Leu	Pro	Ser	Leu	Ser	Pro
			20					25					30		
Ser	Pro	Asp	Val	Asp	Ala	Leu	Phe	Thr	Glu	Leu	Val	Thr	Ala	Cys	Val
		35					40					45			
Pro	Pro	Ser	Pro	Val	Asp	Val	Thr	Lys	Leu	Gly	Pro	Glu	Ala	Gln	Glu
		50				55					60				
Met	Arg	Glu	Gly	Leu	Ile	Arg	Leu	Cys	Ser	Glu	Ala	Glu	Gly	Lys	Leu
65					70					75					80
Glu	Ala	His	Tyr	Ser	Asp	Met	Leu	Ala	Ala	Phe	Asp	Asn	Pro	Leu	Asp
				85					90					95	
His	Leu	Gly	Ile	Phe	Pro	Tyr	Tyr	Ser	Asn	Tyr	Ile	Asn	Leu	Ser	Lys
			100					105					110		
Leu	Glu	Tyr	Glu	Leu	Leu	Ala	Arg	Tyr	Val	Arg	Arg	His	Arg	Pro	Ala
		115					120					125			
Arg	Val	Ala	Phe	Ile	Gly	Ser	Gly	Pro	Leu	Pro	Phe	Ser	Ser	Phe	Val
		130				135					140				
Leu	Ala	Ala	Arg	His	Leu	Pro	Asp	Thr	Met	Phe	Asp	Asn	Tyr	Asp	Leu
145					150					155					160
Cys	Gly	Ala	Ala	Asn	Asp	Arg	Ala	Ser	Lys	Leu	Phe	Arg	Ala	Asp	Thr
				165					170					175	
Asp	Val	Gly	Ala	Arg	Met	Ser	Phe	His	Thr	Ala	Asp	Val	Ala	Asp	Leu
			180					185					190		
Ala	Ser	Glu	Leu	Ala	Lys	Tyr	Asp	Val	Val	Phe	Leu	Ala	Ala	Leu	Val
		195					200					205			
Gly	Met	Ala	Ala	Glu	Asp	Lys	Ala	Lys	Val	Ile	Ala	His	Leu	Gly	Ala
		210				215					220				
His	Met	Ala	Asp	Gly	Ala	Ala	Leu	Val	Val	Arg	Ser	Ala	His	Gly	Ala
225					230					235					240
Arg	Gly	Phe	Leu	Tyr	Pro	Ile	Val	Asp	Pro	Gln	Asp	Ile	Gly	Arg	Gly
			245						250					255	
Gly	Phe	Glu	Val	Leu	Ala	Val	Cys	His	Pro	Asp	Asp	Asp	Val	Val	Asn
		260						265					270		
Ser	Val	Ile	Ile	Ala	Gln	Lys	Ser	Lys	Glu	Val	His	Ala	Asp	Gly	Leu
		275					280					285			
Gly	Ser	Ala	Arg	Gly	Ala	Gly	Arg	Gln	Tyr	Ala	Arg	Gly	Thr	Val	Pro
		290				295				300					
Val	Val	Ser	Pro	Pro	Cys	Arg	Phe	Gly	Glu	Met	Val	Ala	Asp	Val	Thr
305					310					315					320
Gln	Asn	His	Lys	Arg	Asp	Glu	Phe	Ala	Asn	Ala	Glu	Val	Ala	Phe	
				325					330					335	

<210> 6

<211> 1314
 <212> DNA
 <213> Hordeum vulgare L.

<400> 6

ctacttcact	cacactagt	cccagaaaga	aggctgcaat	ggctgcccag	aacaacaaca	60
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cgtcgctcag	cccatccccg	gacgtcgacg	cgctcttcac	cgagctgggtc	acggcgtgcg	180
ttcccccgag	ccccgtggac	gtgaccaagc	tcggccccga	ggcgcaggag	atgcgggagg	240
gcctcatccg	cctctgctcc	gaggccgagg	ggaagctgga	ggcgcactac	tccgacatgc	300
tcgccgcctt	cgacaacccg	ctggatcacc	tcggcatctt	cccctactac	agcaactaca	360
tcaacctcag	caagctggag	tacgagctcc	tggcacgcta	cgtccggcgg	catcgcccgg	420
cccgcgtcgc	gttcatcggc	tccggccccg	tgccgttcag	ctcctttgtc	ctggccgcgc	480
gccacctgcc	cgacaccatg	tttgacaact	acgacctttg	cggcgcggcc	aacgatcgcg	540
ccagcaagct	cttcgcgcg	gacacggacg	tgggtgcccc	catgtcgttc	cacacggccg	600
acgtcgcgga	cctcgccagc	gagctcgcca	agtacgacgt	cgtcttcctg	gccgcgctcg	660
tcggcatggc	cgccgaggac	aaggccaagg	tgatcgcgca	cctcggcgca	cacatggcag	720
acggggcggc	cctcgtcggtg	cgacgcgcac	acggagcgcg	cgggttcctg	tacccgattg	780
tcgacccccca	ggacatcggc	cgcgggcggt	tcgaggtgct	ggccgtgtgc	caccccgacg	840
acgacgtggt	gaactccgtc	atcatcgcac	agaagtccaa	ggaggtgcat	gccgatggac	900
ttggcagcgc	gcgtggtgcc	ggtcgacagt	acgcgcgcgg	cacggtgccg	gttgtcagcc	960
ccccgtgcag	gttcggtgag	atggtggcgg	atgtgaccca	gaaccacaag	agagacgagt	1020
ttgccaacgc	cgaagtggcc	ttttgatcga	tcgtcgccaa	gggacaataa	atgaacgtgg	1080
atgtggtagg	gtaatttgcc	tacctcgctg	cttgatcgct	tgcaatatgt	gcacattttc	1140
ctactaccgc	tgcttatgca	tttcaagcca	tgtgatgttg	gtatccaata	aagtatgtgt	1200
agggtttaca	cgaaatgtc	tttacacctt	gtacgtgtaa	gtgttgacaa	cgatgaattt	1260
cagttcacaa	ttaataaata	gtataatgga	ttcaaaaaaa	aaaaaaaaaa	aaaa	1314

<210> 7
 <211> 329
 <212> PRT
 <213> Hordeum vulgare L.

<400> 7

Met	Asp	Gly	Gln	Ser	Glu	Glu	Val	Asp	Ala	Leu	Val	Gln	Lys	Ile	Thr
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Gly	Leu	His	Ala	Ala	Ile	Ala	Lys	Leu	Pro	Ser	Leu	Ser	Pro	Ser	Pro
			20					25					30		
Asp	Val	Asp	Ala	Leu	Phe	Thr	Asp	Leu	Val	Thr	Ala	Cys	Val	Pro	Pro
			35				40					45			
Ser	Pro	Val	Asp	Val	Thr	Lys	Leu	Ala	Pro	Glu	Ala	Gln	Ala	Met	Arg
	50				55					60					
Glu	Gly	Leu	Ile	Arg	Leu	Cys	Ser	Glu	Ala	Glu	Gly	Lys	Leu	Glu	Ala
65				70					75					80	
His	Tyr	Ser	Asp	Met	Leu	Ala	Ala	Phe	Asp	Asn	Pro	Leu	Asp	His	Leu
			85					90					95		
Gly	Val	Phe	Pro	Tyr	Tyr	Ser	Asn	Tyr	Ile	Asn	Leu	Ser	Lys	Leu	Glu
			100				105						110		
Tyr	Glu	Leu	Leu	Ala	Arg	Tyr	Val	Pro	Gly	Arg	His	Arg	Pro	Ala	Arg
	115				120						125				
Val	Ala	Phe	Ile	Gly	Ser	Gly	Pro	Leu	Pro	Phe	Ser	Ser	Tyr	Val	Leu
	130			135						140					
Ala	Ala	Arg	His	Leu	Pro	Asp	Thr	Val	Phe	Asp	Asn	Tyr	Asp	Leu	Cys
145				150					155					160	
Gly	Ala	Ala	Asn	Asp	Arg	Ala	Thr	Arg	Leu	Phe	Arg	Ala	Asp	Lys	Asp
			165			170						175			
Val	Gly	Ala	Arg	Met	Ser	Phe	His	Thr	Ala	Asp	Val	Ala	Asp	Leu	Thr

<210> 11
 <211> 328
 <212> PRT
 <213> Hordeum vulgare L.

<400> 11
 Met Asp Ala Gln Asn Lys Glu Val Asp Ala Leu Val Gln Lys Ile Thr
 1 5 10 15
 Gly Leu His Ala Ala Ile Ala Lys Leu Pro Ser Leu Ser Pro Ser Pro
 20 25 30
 Asp Val Asp Ala Leu Phe Thr Asp Leu Val Thr Ala Cys Val Pro Pro
 35 40 45
 Ser Pro Val Asp Val Thr Lys Leu Gly Ser Glu Ala Gln Glu Met Arg
 50 55 60
 Glu Gly Leu Ile Arg Leu Cys Ser Glu Ala Glu Gly Lys Leu Glu Ala
 65 70 75 80
 His Tyr Ser Asp Met Leu Ala Ala Phe Asp Asn Pro Leu Asp His Leu
 85 90 95
 Gly Met Phe Pro Tyr Tyr Ser Asn Tyr Ile Asn Leu Ser Lys Leu Glu
 100 105 110
 Tyr Glu Leu Leu Ala Arg Tyr Val Pro Gly Gly Ile Ala Arg Pro Ala
 115 120 125
 Val Ala Phe Ile Gly Ser Gly Pro Leu Pro Phe Ser Ser Tyr Val Leu
 130 135 140
 Ala Ala Arg His Leu Pro Asp Ala Met Phe Asp Asn Tyr Asp Leu Cys
 145 150 155 160
 Ser Ala Ala Asn Asp Arg Ala Ser Lys Leu Phe Arg Ala Asp Lys Asp
 165 170 175
 Val Gly Ala Arg Met Ser Phe His Thr Ala Asp Val Ala Asp Leu Thr
 180 185 190
 Arg Glu Leu Ala Ala Tyr Asp Val Val Phe Leu Ala Ala Leu Val Gly
 195 200 205
 Met Ala Ala Glu Asp Lys Ala Lys Val Ile Pro His Leu Gly Ala His
 210 215 220
 Met Ala Asp Gly Ala Ala Leu Val Val Arg Ser Ala Gln Ala Arg Gly
 225 230 235 240
 Phe Leu Tyr Pro Ile Val Asp Pro Gln Asp Ile Gly Arg Gly Gly Phe
 245 250 255
 Glu Val Leu Ala Val Cys His Pro Asp Asp Asp Val Val Asn Ser Val
 260 265 270
 Ile Ile Ala His Lys Ser Lys Asp Val His Ala Asn Glu Arg Pro Asn
 275 280 285
 Gly Arg Gly Gly Gln Tyr Arg Gly Ala Val Pro Val Val Ser Pro Pro
 290 295 300
 Cys Arg Phe Gly Glu Met Val Ala Asp Val Thr His Lys Arg Glu Glu
 305 310 315 320
 Phe Thr Asn Ala Glu Val Ala Phe
 325

<210> 12
 <211> 1352
 <212> DNA
 <213> Hordeum vulgare L.

<400> 12

ctccaacttcg	ctcctgtgcc	tcaggtagcc	acaacatata	gtattaaaat	ggatgcccag	60
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ctgccgtccc	tcagcccata	acccgacgtc	gacgcgtctt	tcaccgacct	ggtcacccgc	180
tgcgtccccc	cgagccccgt	ggacgtgacc	aagctcgggt	cggaggcgca	ggagatgcgg	240
gagggcctca	tccgcctctg	ctccgaggcc	gaggggaagc	tggaggcgca	ctactccgac	300
atgctggccg	ccttcgacaa	cccgtctgac	cacctcggca	tgttccccta	ctacagcaac	360
tacatcaacc	tcagcaagct	ggagtacgag	ctcctggcgc	gctacgtgcc	gggcggcatc	420
gcccggcccc	ctgtcgcgtt	catcggctcc	ggcccgtgc	cgttcagctc	ctacgtcctc	480
gocgctcgcc	acctgcccga	cgccatgttc	gacaactacg	acctgtgtag	cgcggccaac	540
gaccgtgcca	gcaagctggt	ccgcgcggac	aaggacgtgg	gcgcccgcac	gtctttccac	600
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gcgctcgtgg	gcatggctgc	cgaggacaag	gccaaaggta	ttccgcacct	cggcgcgcac	720
atggcggacg	gggcggccct	cgtcgtgcgc	agtgcgcagg	cacgtggggt	cctctacccg	780
atcgtcgatc	cccaggacat	cggtcgaggc	gggtttgagg	tgctggccgt	gtgtcacccc	840
gacgatgacg	tggtgaactc	cgtcatcatc	gcacacaagt	ccaaggacgt	gcatgccaat	900
gaacgtccca	acgggcgtgg	tggacagtac	cggggcgcgg	taccggtggt	cagcccgcgc	960
tgcaggttcg	gtgagatggt	ggcggacgtg	gagaggagtt	gagaggagtt	caccaacgcg	1020
gaagtggcct	tctgatcggt	gcgagggaat	gaaaatgaag	gtggacgtgt	gtggtcagca	1080
tccatacgtg	gctgcctgct	tcacgcgttg	caatcgctact	actacctacc	tatgcagtct	1140
aagtcattgt	ttgtcaatgt	aagtgtgatg	tttacactag	tctatgaaag	gcagggcaga	1200
cgagggtagt	gtgccaaagta	acagtgtgtc	attataggtg	taagtgttga	gaataagacc	1260
atTTTTgttc	acaaatagta	tgatgtaatc	ggtgtcatat	tcgtattgag	tacatttgtc	1320
aagttggttg	ctaaaaaaaa	aaaaaaaaaa	aa			1352

<210> 13

<211> 329

<212> PRT

<213> Hordeum vulgare L.

<400> 13

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Gly	Leu	His	Ala	Ala	Ile	Ala	Lys	Leu	Pro	Ser	Leu	Ser	Pro	Ser	Pro
			20					25					30		
Asp	Val	Asp	Ala	Leu	Phe	Thr	Asp	Leu	Val	Thr	Ala	Cys	Val	Pro	Pro
		35					40					45			
Ser	Pro	Val	Asp	Val	Thr	Lys	Leu	Ala	Pro	Glu	Ala	Gln	Ala	Met	Arg
		50				55					60				
Glu	Gly	Leu	Ile	Arg	Leu	Cys	Ser	Glu	Ala	Glu	Gly	Lys	Leu	Glu	Ala
65				70					75					80	
His	Tyr	Ser	Asp	Met	Leu	Ala	Ala	Phe	Asp	Asn	Pro	Leu	Asp	His	Leu
			85					90						95	
Gly	Val	Phe	Pro	Tyr	Tyr	Ser	Asn	Tyr	Ile	Asn	Leu	Ser	Lys	Leu	Glu
			100					105					110		
Tyr	Glu	Leu	Leu	Ala	Arg	Tyr	Val	Pro	Gly	Gly	Ile	Ala	Pro	Ala	Arg
		115					120					125			
Val	Ala	Phe	Ile	Gly	Ser	Gly	Pro	Leu	Pro	Phe	Ser	Ser	Tyr	Val	Leu
	130					135					140				
Ala	Ala	Arg	His	Leu	Pro	Asp	Thr	Val	Phe	Asp	Asn	Tyr	Val	Pro	Val
145				150					155					160	
Arg	Ala	Ala	Asn	Asp	Arg	Ala	Thr	Arg	Leu	Phe	Arg	Ala	Asp	Lys	Asp
			165					170					175		
Val	Gly	Ala	Arg	Met	Ser	Phe	His	Thr	Ala	Asp	Val	Ala	Asp	Leu	Thr
		180					185					190			
Asp	Glu	Leu	Ala	Thr	Tyr	Asp	Val	Val	Phe	Leu	Ala	Ala	Leu	Val	Gly
	195					200					205				
Met	Ala	Ala	Glu	Asp	Lys	Gly	Gln	Gly	Asp	Pro	His	Leu	Gly	Ala	His

210	215	220
Met Ala Asp Gly Ala Ala Leu Val Arg Ser Ala His Gly Ala Arg Gly		
225	230	235
Phe Leu Tyr Pro Ile Val Asp Pro Gln Asp Ile Gly Arg Gly Gly Phe		240
	245	250
Glu Val Leu Ala Val Cys His Pro Asp Asp Asp Val Val Asn Ser Val		255
	260	265
Ile Ile Ala Gln Lys Ser Lys Asp Met Phe Ala Asn Gly Pro Arg Asn		270
	275	280
Gly Cys Gly Gly Arg Tyr Ala Arg Gly Thr Val Pro Val Val Ser Pro		285
	290	295
Pro Cys Arg Phe Gly Glu Met Val Ala Asp Val Thr Gln Lys Arg Glu		300
305	310	315
Glu Phe Ala Lys Ala Glu Val Ala Phe		320
	325	

<210> 14
 <211> 1371
 <212> DNA
 <213> Hordeum vulgare L.

<220>
 <221> misc_feature
 <222> (8)...(8)
 <223> n = t, c, a or g

<400> 14

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tggtcaggtg	ccaagaagac	ataaaaaatgg	acgcccagag	caaggaggtc	gacgcccttg	120
tccagaagat	caccggcctc	cacgccgcca	tcgccaagct	gccctcgctc	agcccgtccc	180
cggacgtcga	cgcgctcttc	accgacctgg	tcaccgcgtg	cgtgcccccg	agccccgtgg	240
acgtgaccaa	gctcgccccg	gaggcgcagg	cgatgcggga	gggcctcatc	cgcctctgct	300
ccgaggccga	gggcaagctg	gaggcgcact	actccgacat	gctcgccgcc	ttcgacaacc	360
cgctcgacca	cctcggcgctc	ttccccact	acagcaacta	catcaacctc	agcaagctcg	420
agtacgagct	cctcgcgcgc	tacgtgcccc	gcggcatcgc	cccggccccg	gtcgccctca	480
tcggctccgg	cccgcctccc	ttcagctcct	acgtcctcgc	cgcgcgccac	ctgccccgaca	540
ccgtgttcga	caactacgta	cctgtgcgcg	cggccaacga	ccgcgcgacc	aggctgttcc	600
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tccgcagcgc	gcacggggcg	cgtgggttcc	tctacccgat	cgtcgatccc	caagacattg	840
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tcatcatcgc	gcagaagtct	aaggacatgt	ttgccaatgg	acctcgcaac	gggtgtgggtg	960
gacggtacgc	gcgaggcacg	gtgccggtgg	tcagcccgcc	ctgcaggttc	ggcgagatgg	1020
tggcagacgt	gaccagaag	agagaggagt	ttgccaaggc	ggaagtggcc	ttctgattgc	1080
tgcgagggtca	ccatccgtat	gccgctgcta	cctttcaata	tcttgcaatc	gtagggtggcg	1140
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tgtgttgctt	acacgcgcac	gtcttgtaca	ctcggctctc	agaaggcagg	gcagatcaag	1260
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<210> 15
 <211> 324
 <212> PRT
 <213> Oryza sativa L.

<400> 15

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Leu	His	Ala	Ala	Ser	Lys	Leu	Pro	Ser	Leu	Ser	Pro	Ser	Ala	Glu	Val
		20						25					30		
Asp	Ala	Leu	Phe	Thr	Asp	Leu	Val	Thr	Ala	Cys	Val	Pro	Ala	Ser	Pro
		35					40					45			
Val	Asp	Val	Ala	Lys	Leu	Gly	Pro	Glu	Ala	Gln	Ala	Met	Arg	Glu	Glu
	50					55					60				
Leu	Arg	Leu	Cys	Ser	Ala	Ala	Glu	Gly	His	Leu	Glu	Ala	His	Tyr	Ala
65				70						75				80	
Asp	Met	Leu	Ala	Ala	Phe	Asp	Asn	Pro	Leu	Asp	His	Leu	Ala	Arg	Phe
			85					90						95	
Pro	Tyr	Tyr	Gly	Asn	Tyr	Val	Asn	Leu	Ser	Lys	Leu	Glu	Tyr	Asp	Leu
			100					105					110		
Leu	Val	Arg	Tyr	Val	Pro	Gly	Ala	Pro	Thr	Arg	Val	Ala	Phe	Val	Gly
		115					120					125			
Ser	Gly	Pro	Leu	Pro	Phe	Ser	Ser	Leu	Val	Leu	Ala	Ala	His	His	Leu
	130					135					140				
Pro	Asp	Ala	Val	Phe	Asp	Asn	Tyr	Asp	Arg	Cys	Gly	Ala	Ala	Asn	Glu
145				150						155				160	
Arg	Ala	Arg	Arg	Leu	Phe	Arg	Gly	Ala	Asp	Glu	Gly	Leu	Gly	Ala	Arg
			165					170						175	
Met	Ala	Phe	His	Thr	Ala	Asp	Val	Ala	Thr	Leu	Thr	Gly	Glu	Leu	Gly
		180						185					190		
Ala	Tyr	Asp	Val	Val	Phe	Leu	Ala	Ala	Leu	Val	Gly	Met	Ala	Ala	Glu
	195						200					205			
Glu	Lys	Ala	Gly	Val	Ala	His	Leu	Gly	Ala	His	Met	Ala	Asp	Gly	Ala
	210					215					220				
Ala	Leu	Val	Val	Arg	Thr	Ala	His	Gly	Ala	Arg	Gly	Phe	Leu	Tyr	Pro
225				230						235				240	
Val	Asp	Pro	Glu	Asp	Val	Arg	Arg	Gly	Gly	Phe	Asp	Val	Leu	Ala	Val
			245					250					255		
Cys	His	Pro	Glu	Asp	Glu	Val	Asn	Ser	Val	Val	Ala	Arg	Lys	Val	Gly
		260						265					270		
Ala	Ala	Ala	Ala	Ala	Ala	Ala	Ala	Arg	Arg	Asp	Glu	Leu	Ala	Asp	Ser
		275					280					285			
Arg	Gly	Val	Val	Leu	Pro	Val	Val	Gly	Pro	Pro	Ser	Thr	Cys	Cys	Lys
	290					295					300				
Val	Glu	Ala	Ser	Ala	Val	Glu	Lys	Ala	Glu	Glu	Phe	Ala	Ala	Asn	Lys
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Glu	Leu	Ser	Val												

<210> 16

<211> 1372

<212> DNA

<213> Oryza sativa L.

<400> 16

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ctggctcgaga	agatcgccgg	cctccacgcc	gccatctcca	agctgccgtc	gctgagccca	180
tccgccgagg	tggacgcgct	cttcaccgac	ctcgtcacgg	cgtgcgtccc	ggcgagcccc	240
gtcgacgtgg	ccaagctcgg	cccgaggcg	caggcgatgc	gggaggagct	catccgcctc	300
tgctccgccc	ccgagggcca	cctcgaggcg	cactacgccg	acatgctcgc	cgcttcgcac	360
aacccgctcg	accacctcgc	ccgcttcccc	tactacggca	actacgtcaa	cctgagcaag	420
ctggagtagc	acctcctcgt	ccgctacgtc	cccggcattg	ccccaccgcg	cgctgccttc	480

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gcggtgttcg	acaactacga	ccggtgcggc	gcggccaacg	agcgggcgag	gaggctgttc	600
cgcggcgccg	acgagggcct	cggcgcgcg	atggcgttcc	acaccgccga	cgtggcgacc	660
ctgacggggg	agctcggcgc	gtacgacgtc	gtgttcctgg	cggcgctcgt	gggcatggcg	720
gccgaggaga	aggccggggg	gatcgcgcac	ctgggcgcgc	acatggcgga	cggcgcgcg	780
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aactccgtca	tcgtcgcccc	caaggctcgg	gccgccgccg	ccgccgccgc	ggcgcgcgaga	960
gacgagctcg	cggactcgcg	cggcggtggt	ctgccggtgg	tcgggcccgc	gtccacgtgc	1020
tgcaagggtg	aggcgagcgc	ggttgagaag	gcagaagagt	ttgccgccaa	caaggagctg	1080
tccgtctaac	agccggacga	tcgaaaggcg	cactatatta	tggcaataaaa	tcattttgatt	1140
atacttatgc	tgcatttgcg	aagctaagg	atactatgca	agccatatgt	ttgtgttcgt	1200
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<210> 17

<211> 320

<212> PRT

<213> Arabidopsis thaliana

<400> 17

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			20					25					30		
Thr	Leu	Phe	Gly	Gln	Leu	Val	Ser	Thr	Cys	Leu	Pro	Thr	Asp	Thr	Asn
	35						40					45			
Ile	Asp	Val	Thr	Asn	Met	Cys	Glu	Glu	Val	Lys	Asp	Met	Arg	Ala	Asn
	50					55					60				
Leu	Ile	Lys	Leu	Cys	Gly	Glu	Ala	Glu	Gly	Tyr	Leu	Glu	Gln	His	Phe
65					70					75				80	
Ser	Thr	Ile	Leu	Gly	Ser	Leu	Gln	Glu	Asp	Gln	Asn	Pro	Leu	Asp	His
				85					90					95	
Leu	His	Ile	Phe	Pro	Tyr	Tyr	Ser	Asn	Tyr	Leu	Lys	Leu	Gly	Lys	Leu
	100							105					110		
Glu	Phe	Asp	Leu	Leu	Ser	Gln	His	Ser	Ser	His	Val	Pro	Thr	Lys	Ile
	115						120					125			
Ala	Phe	Val	Gly	Ser	Gly	Pro	Met	Pro	Leu	Thr	Ser	Ile	Val	Leu	Ala
	130					135					140				
Lys	Phe	His	Leu	Pro	Asn	Thr	Thr	Phe	His	Asn	Phe	Asp	Ile	Asp	Ser
145					150					155				160	
His	Ala	Asn	Thr	Leu	Ala	Ser	Asn	Leu	Val	Ser	Arg	Asp	Pro	Asp	Leu
			165						170					175	
Ser	Lys	Arg	Met	Ile	Phe	His	Thr	Thr	Asp	Val	Leu	Asn	Ala	Thr	Glu
	180							185					190		
Ala	Leu	Asp	Gln	Tyr	Asp	Val	Val	Phe	Leu	Ala	Ala	Leu	Val	Gly	Met
	195						200						205		
Asp	Lys	Glu	Ser	Lys	Val	Lys	Ala	Ile	Glu	His	Leu	Glu	Lys	His	Met
	210					215					220				
Ala	Pro	Gly	Ala	Val	Leu	Met	Leu	Arg	Arg	Ala	His	Ala	Leu	Arg	Ala
225					230					235				240	
Phe	Leu	Tyr	Pro	Ile	Val	Asp	Ser	Ser	Asp	Leu	Lys	Gly	Phe	Gln	Leu
			245						250					255	
Leu	Thr	Ile	Tyr	His	Pro	Thr	Asp	Asp	Val	Val	Asn	Ser	Val	Val	Ile
			260					265					270		
Ala	Arg	Lys	Leu	Gly	Gly	Pro	Thr	Thr	Pro	Gly	Val	Asn	Gly	Thr	Arg

275	280	285
Gly Cys Met Phe Met Pro Cys Asn Cys Ser Lys	Ile His Ala Ile Met	
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Asn Asn Arg Gly Lys Lys Asn Met Ile Glu Glu	Phe Ser Thr Ile Glu	
305	310	315 320

<210> 18
 <211> 963
 <212> DNA
 <213> Arabidopsis thaliana

<400> 18

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acgtgcttac	ccacggatac	aaacatcgat	gtcacaaata	tgtgtgaaga	agtcaaagac	180
atgagagcta	atctcatcaa	gctttgtggt	gaagccgaag	gttatttgga	gcaacacttc	240
tccacaatttt	tgggatcttt	acaagaagac	caaaaccac	ttgaccatct	acacatcttt	300
ccttactact	ccaactacct	caagctaggc	aagctcgagt	tcgatctcct	gagccaacac	360
tcaagccatg	tccccaccaa	gattgccttc	gtgggttcgg	gtccgatgcc	tctcacatcc	420
atcgtattgg	ccaagtttca	cctccccaac	acgacgttcc	acaactttga	catcgactca	480
cacgcaaaca	cactcgcttc	aaacctcgtc	tctcgcgacc	cggacctctc	aaaacgcatg	540
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ttcttagcgg	cgctttagg	gatggacaaa	gagtcaaagg	tcaaagccat	cgagcacttg	660
gagaaacaca	tggctcctgg	agctgttctt	atgctaagga	gggctcatgc	tctcagagct	720
ttcttatatc	caatcgttga	ctcgtctgat	ctcaaaggct	ttcaactctt	gaccatctat	780
catccaaccg	atgacgtggt	taactcgggt	gtgatcgcac	gtaagctcgg	tggtccgacc	840
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<210> 19
 <211> 320
 <212> PRT
 <213> Arabidopsis thaliana

<400> 19

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Thr Leu Phe Arg Gln Leu Val Ser Thr Cys Leu Pro Thr Asp Thr Asn	
35 40 45	
Ile Asp Val Thr Glu Ile His Asp Glu Lys Val Lys Asp Met Arg Ser	
50 55 60	
His Leu Ile Lys Leu Cys Gly Glu Ala Glu Gly Tyr Leu Glu Gln His	
65 70 75 80	
Phe Ser Ala Ile Leu Gly Ser Phe Glu Asp Asn Pro Leu Asn His Leu	
85 90 95	
His Ile Phe Pro Tyr Tyr Asn Asn Tyr Leu Lys Leu Gly Lys Leu Glu	
100 105 110	
Phe Asp Leu Leu Ser Gln His Thr Thr His Val Pro Thr Lys Val Ala	
115 120 125	
Phe Ile Gly Ser Gly Pro Met Pro Leu Thr Ser Ile Val Leu Ala Lys	
130 135 140	
Phe His Leu Pro Asn Thr Thr Phe His Asn Phe Asp Ile Asp Ser His	
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<210> 20
<211> 963
<212> DNA
<213> Arabidopsis thaliana
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<210> 21
<211> 320
<212> PRT
<213> Arabidopsis thaliana
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Ser Ser Ile Leu Thr Ser Tyr Gln Asp Asn Pro	Leu His His Leu Asn	80
85	90	95
Ile Phe Pro Tyr Tyr Asn Asn Tyr Leu Lys Leu Gly Lys Leu Glu Phe	100	105
110	115	120
Asp Leu Leu Glu Gln Asn Leu Asn Gly Phe Val Pro Lys Ser Val Ala	125	130
135	140	145
Phe Ile Gly Ser Gly Pro Leu Pro Leu Thr Ser Ile Val Leu Ala Ser	150	155
160	165	170
Phe His Leu Lys Asp Thr Ile Phe His Asn Phe Asp Ile Asp Pro Ser	175	180
185	190	195
Ala Asn Ser Leu Ala Ser Leu Leu Val Ser Ser Asp Pro Asp Ile Ser	200	205
210	215	220
Gln Arg Met Phe Phe His Thr Val Asp Ile Met Asp Val Thr Glu Ser	225	230
235	240	245
Leu Lys Ser Phe Asp Val Val Phe Leu Ala Ala Leu Val Gly Met Asn	250	255
260	265	270
Lys Glu Glu Lys Val Lys Val Ile Glu His Leu Gln Lys His Met Ala	275	280
285	290	295
Pro Gly Ala Val Leu Met Leu Arg Ser Ala His Gly Pro Arg Ala Phe	300	305
310	315	320
Leu Tyr Pro Ile Val Glu Pro Cys Asp Leu Gln Gly Phe Glu Val Leu		
Ser Ile Tyr His Pro Thr Asp Asp Val Ile Asn Ser Val Val Ile Ser		
Lys Lys His Pro Val Val Ser Ile Gly Asn Val Gly Gly Pro Asn Ser		
Cys Leu Leu Lys Pro Cys Asn Cys Ser Lys Thr His Ala Lys Met Asn		
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<210> 22

<211> 963

<212> DNA

<213> Arabidopsis thaliana

<400> 22

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acatgcatac	caccaaacc	taacatcgat	gtcaccaaga	tgtgtgacag	agtccaagag	180
attcgactta	atctcatcaa	gatttgtggt	ctagccgaag	gtcacttaga	aaaccatttc	240
tcttcgatct	tgacctctta	ccaagacaac	ccacttcac	atttaaaca	tttcccttat	300
tacaacaact	atttgaaact	cggaaaagctc	gagttcgacc	tcctcgaaca	aaacctaata	360
ggctttgtcc	caaagagtgt	ggctttcatt	ggatctggtc	ctcttcctct	cacttccatc	420
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ctttatccga	tcgttgagcc	gtgtgatctt	caggggttcg	agggtttgtc	tatttatcac	780
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gcgaaaatga	acaagaacat	gatgatcgag	gagttcggag	ctagggagga	acagttgtct	960
ttaa						963